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PURSUING THE FRUITS OF KNOWLEDGE: COGNITIVE ETHNOBOTANY IN MISSOURI'S LITTLE DIXIE

JUSTIN M. NOLAN
Department of Anthropology, University of Missouri
Columbia, MO 65211

ABSTRACT.—This study investigates ethnobotanical knowledge variation in Little Dixie, a folk cultural region in Central Missouri. Data were obtained from twenty "experts" and twenty "novices" who free-listed the names and uses for wild plants and rated them according to cultural usefulness, ecological value, beauty, and overall appeal. It is hypothesized and demonstrated that novices privilege species that are perceptually distinctive and ecologically abundant, while experts emphasize species with high use potential. Accordingly, novices emphasize beauty, a form-based variable, in their evaluation of listed species, while experts emphasize cultural utility, a function-based variable. These results suggest that the acquisition of ethnobotanical expertise entails a shift from morphological, imagistic information processing to the cognitive assimilation of abstract, utilitarian factors gained through learning and cultural experience.

Key words: folk biology, cognition and expertise, free-listing, U.S. regional cultures.

RESUMEN.—Este trabajo investiga la variación del conocimiento etnobotánico en Little Dixie, una región cultural popular en Misuri central. Los datos se obtuvieron de veinte "expertos" y veinte "novatos" que escribieron una lista al azar de los nombres y los usos de plantas silvestres y las calificaron de acuerdo a la utilidad cultural, valor ecológico, belleza, y el atractivo general que tienen. Se hace hipótesis y se demuestra que los novatos privilegian las especies de plantas que son perceptualmente distintivas y ecológicamente abundantes, mientras los expertos hacen hincapié en las especies que tienen potencial alto de utilidad. Como corresponde, los novatos acentúan la belleza, una variable basada de forma, en su evaluación de especies puestas a lista, mientras los expertos ponen énfasis en la utilidad cultural, una variable basada de la función. Estos resultados sugieren que la adquisición de competencia etnobotánica conlleva un cambio morfológico, procesamiento de información basada de imágenes a la asimilación cognitiva del resumen, factores utilitarios ganados por el aprendizaje y la experiencia cultural.

RÉSUMÉ.—Cette étude examine la variation de connaissances éthno-botaniques dans le Little Dixie, une région culturelle du Missouri central. Les données ont été obtenues de vingt "experts" et vingt "novices" qui ont énuméré les noms et les usages de plantes sauvages et les ont évaluées selon leur utilité culturelle, leur valeur écologique, leur beauté, et leur attrait général. Il est démontré que les novices privilègient les espèces qui sont perceptuellement distinctes et abondantes dans l'environnement alors que les experts prêtent d'avantage attention aux espèce qui ont un usage potentiel élevé. En conséquence, les novices soulignent la beauté, une variable basée sur la forme, dans leur évaluation des espèces énumérées alors que les experts soulignent l'utilité culturelle, une variable basée sur la fonction. Ces résultats suggèrent que l'acquisition d'expertise éthno-botanique présuppose une modification allant du traitement morphologique et imagée de l'information à l'assimilation de facteurs abstraits et utilitaires grâce à l'étude et à l'expérience culturelle.

INTRODUCTION

Ethnobiological knowledge is a complex phenomenon based fundamentally on human recognition of the perceptual and functional attributes that characterize living things. Over the past two decades, considerable progress has been made toward understanding how people transform their natural worlds into meaningful cultural categories (e.g., Brown 1984, Hunn 1982, Berlin 1992, Medin and Atran 1999, Ford 2001, etc.). Relatively neglected, however, is the study of variation within ethnobotanical knowledge systems. Research indicates that the differences in how people perceive biological domains are related to levels of respondent expertise, whereby experts have access to more kinds of information about a domain than do novices, resulting in different patterns of domain organization. For instance, Boster and Johnson (1989) demonstrate that novices rely on mostly morphological cues when learning about and classifying marine fishes, while experts make use of morphological signals in addition to utilitarian information gained through personal experience. However, it remains yet undetermined whether or not experts and novices emphasize common referential features in their conceptualization of plants or if they maintain separate patterns of ethnobotanical cognition. To answer the question, this project will explore the structure of ethnobotanical knowledge among residents of a regional culture in the U.S. Midwest.

SCOPE OF THE STUDY

A defining feature of expertise is the ability to recognize and process multiple kinds of information about a cognitive domain. For example, becoming an expert usually entails commanding a diversified understanding of how things can be used practically or categorized cognitively. This is true for the rare coin expert, who knows the salient features to examine when appraising unusual currency, and for the wild plant expert, who is aware of the numerous cultural uses for local flora. Furthermore, cognitive anthropological research has noted that the acquisition of expertise brings about a gradual shift in the learning process itself. That is, novices demonstrate highly imagistic recognition and respond more readily to easily perceptible morphological features when describing a domain. Experts, on the other hand, utilize more abstract systems of discrimination and emphasize the less obvious utilitarian features when evaluating items (e.g., Boster and Johnson 1989, Chick and Roberts 1987, Kempton 1981). This progression has been noted in a number of related psychological studies, ranging from expert-novice understanding of physics problems (Chi et al. 1981) and X-ray pictures (Lesgold et al. 1988), to studies of how connoisseurs and amateurs appreciate wine (Solomon 1997) and art (Hekkert and Van Wieringen 1997).

Two hypotheses stem from these collective findings. Given the presumed differences in how experts and novices approach and process information about

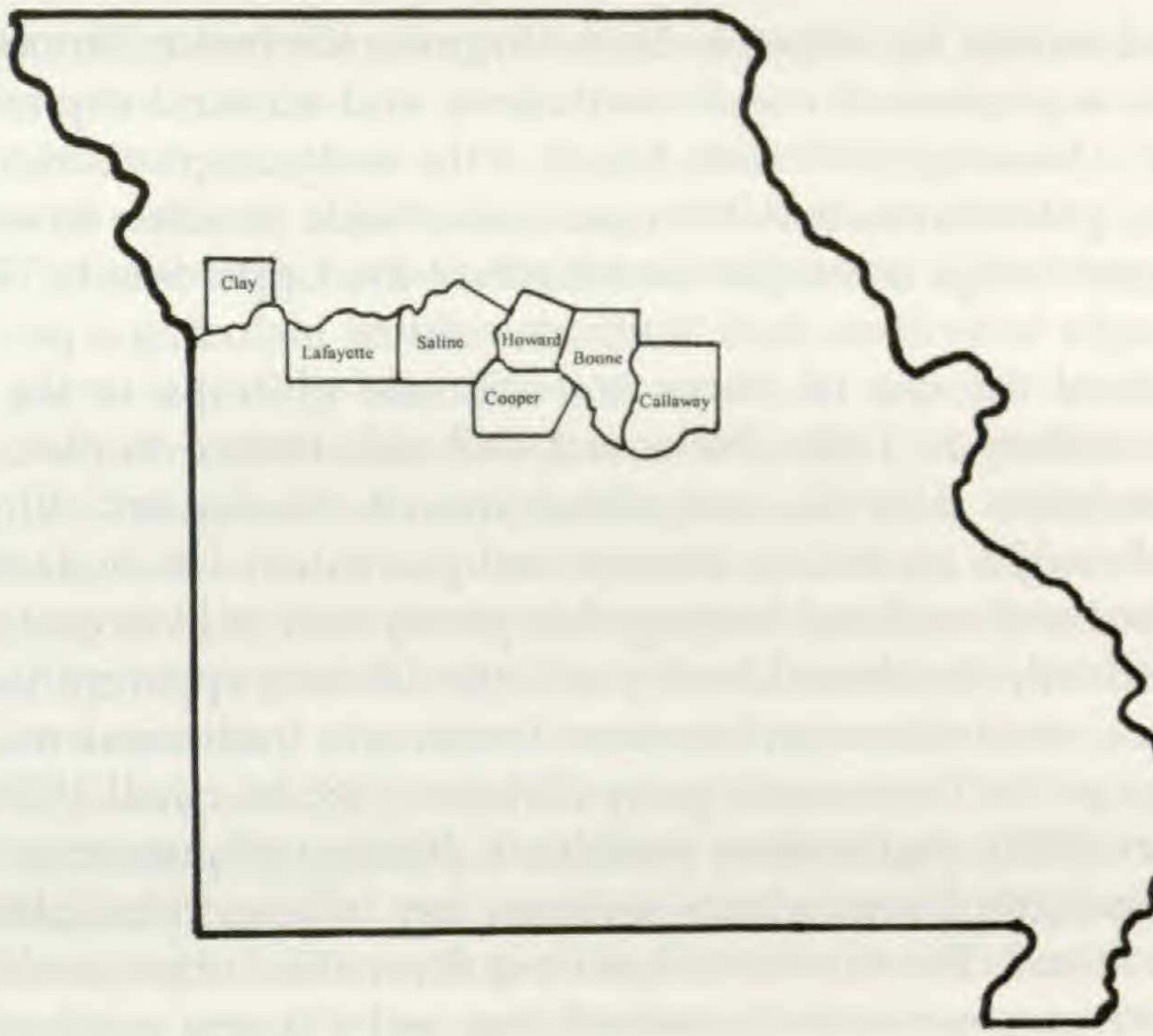


FIGURE 1.—Little Dixie Counties of Missouri.

a domain, it follows that novice and expert plant users emphasize different focal attributes in their cognitive articulation of wild botanicals. That is, novices are expected to prioritize species that are perceptually distinctive and ecologically abundant, while experts should focus on species with salient use potential. Secondly, it is proposed that novices prioritize beauty, a form-based variable, in their appreciation of plants, and that experts emphasize utility, a function-based variable, in their plant evaluations.

DESCRIPTION OF THE STUDY REGION

"Little Dixie" is the name given to the corridor of gently rolling farmland that straddles the Missouri River in the central section of the state. In an historical account of slavery and cultural life in Little Dixie, R. Douglas Hurt (1992) proposes a map of the area that includes Callaway, Boone, Cooper, Howard, Saline, Lafayette, and Clay counties (Figure 1). Situated roughly between the corn belt and the Ozark Mountain region, Little Dixie represents a transition zone of the United States where the glaciated plains join the Interior Highlands to the south. The landscape is ecologically diverse, and supports between 80 and 90 native plant species that are absent or rarely found elsewhere in the state (Yatskievych 1999). The region's physiographic character is one of rolling prairies, savannas, upland forests, and sandstone bluffs along the streams and rivers. Oak, hickory, and cedar predominate in the timbered hills and bluestem-dominated tallgrasses carpet the fields and savannas. Birch, maple, poplar, and willow are common along the bottomlands of the Missouri River and its numerous tributaries.

The Cultural Landscape.—Little Dixie has been described as "a section of central Missouri where Southern ways are much in evidence—an island in the Lower

Midwest settled mostly by migrants from Virginia, Kentucky, Tennessee, and the Carolinas, who transplanted social institutions and cultural expressions to the new landscape" (Marshall 1979:400). Many of the early migrants were prominent families whose plantations and fortunes were built around farming tobacco, hemp, cotton, and indigo across the farmlands of the Upper South. These wealthy aristocrats brought with them their Southern culture, including a plantation economy that involved the use of slaves and the sale of crops to the commercial market. Other settlers of Little Dixie included subsistence farmers, merchants, builders, and teachers who also originated from Kentucky and Virginia. While the Civil War brought an end to slavery and plantation life in Little Dixie, the tenacious Upper South cultural heritage has persevered in lives and minds of the people. The distinctly Southern identity of Little Dixie is apparent today through the local dialect, antebellum architecture, foodways, traditional music, and the strong influence of the Democratic party (Crisler 1948; Marshall 1979, 1981; Skillman 1988; Hurt 1992). Agriculture remains a strong component of the present-day economy in Little Dixie, where soybean, hay, wheat, corn, cattle, and hogs are commonly raised. The economic base has diversified considerably to include education, health care services, manufacturing, and a strong retail and wholesale industry, each of which has brought growth and progress to the region.

Wild Plants, Social Relations, and Group Identity.—The people of Little Dixie are devoted to a lifestyle of relative independence. One of the ways in which people maintain and express their self-sufficiency is through the frequent and regular procurement of wild plants for a variety of purposes. A number of local species are valued for their purity and wholesomeness, and, in some cases, for their rarity. Whether enjoyed as food, taken as medicine, or valued aesthetically, wild plant procurement plays an important role in the social lives of the women and men of Little Dixie. The knowledge and work required in locating these plants from the outdoors and preparing them for personal use is developed over time by participating in family walks outdoors, helping out in the kitchen, and listening to the stories of mothers, fathers, and grandparents. Procuring and sharing wild plant resources symbolizes a neighborly communion with the local landscape, the sharing of personal skill, effort, and craftsmanship, a reverence for traditional customs, and the expression of group identity.

METHODS AND MATERIALS

In order to examine the patterns of variation in ethnobotanical knowledge and classification in Little Dixie, 20 experts and 20 novice (non-expert) consultants were selected from the seven counties within Little Dixie's borders. Most of the respondents were selected from Howard, Boone, and Callaway Counties, which constitute the cultural and geographic locus of the region. Howard County boasts a growing reputation as both a center for commercial plant growers and a hub for local herbalists. At least one expert and one novice respondent was consulted from each of Little Dixie's seven counties. Botanical knowledge has been shown to vary substantially among expert consultants (e.g., Medin et al. 1997). Therefore, to ensure an adequate representation of different types, experts in the sample included both males and females with both commercial and non-commercial interests in wild plant use. Some experts operate private herbal practices, others sell botanical products at stores or from their homes through mail-order business or have contracts to cultivate selected species, while others are simply local people—from farmers to schoolteachers—who have exceptional knowledge of local flora. Novices also included male and female Little Dixie natives of mixed ages, but for whom wild plant collecting is neither a commercial activity nor a serious hobby. Both expert and non-expert consultants were selected by reputation (Martin 1995), followed by the "snowball" technique (Bernard 1994) in which one respondent recommends another, who in turn recommends another, and so forth.

Using the same interview protocol for experts and novices, both groups were consulted during interviews that spanned from the summer of 1997 to the fall of 1999. Interviews consisted of a semi-structured interview containing open-ended questions, free-listing, and a sociodemographic survey. To begin the interview, consultants were casually queried about their personal experience with local flora. Questions included "how did you come to know about wild plants?" and "what do you find meaningful about using wild plants?". The first section of the survey included a free-list task (Weller and Romney 1988, Bernard 1994), an effective elicitation tool for ethnobotanists (Martin 1995, Cotton 1996). Respondents were asked to write down the names of as many kinds of locally available, useful wild plants as they could think of, using their own judgment of what is considered *useful*. Respondents were then asked to indicate how each plant is used (e.g., medicinal, edible, ornamental, etc.), the specific application for the plant (e.g., pie filling, heartburn remedy, etc.), the part of the plant that is used (e.g., stem, root, etc.), and the mode of preparation (e.g., air-dried, boiled in water, etc.). This data collection process, known as successive free-listing (Ryan et al. 2000), provides a rich, descriptive database for examining plant use patterns, and has been used in a number of ethnobotanical surveys.

There is reason to believe that experts and novices exhibit different expressive and aesthetic evaluations of the constituents of semantic domains[1] (e.g., Chick and Roberts 1987), which may in turn effect how domains are organized cognitively (Nolan and Robbins 2001). To explore these differences, a rating exercise was administered with the free-list task in which respondents of both groups were asked to assign a number between one and five to each named plant based on the evaluation of four different variables: overall appeal, usefulness, ecological value, and beauty. The mean ranks were calculated on all four variables for the most commonly mentioned plants, and a multiple correlation analysis was performed on these ranks to determine how the two groups compare in their conceptual evaluation of salient species.

RESULTS

Analysis of the Free-Lists.—Of the 187 plant names collected from both groups, experts listed a total of 160 plants, comprising 85.6% of the composite list. For the experts, list lengths ranged from 12 to 61 plant names, with a median of 25.5. The mean list length was 26.4 plant names, with a standard deviation of 13.3 and a coefficient of relative variation (CRV) of .504 (see Table 1 for a quantitative

TABLE 1.—Number of wild plants and applications reported by experts and novices.

	Number of plants mentioned		Number of applications listed	
	Experts	Novices	Experts	Novices
Mean	26.7	9.1	37.4	11.1
Median	25.5	8.5	36	10.5
S.D.	13.3	3.8	18.9	4.9
Maximum	61	17	88	21
Minimum	12	5	14	5

summary of free-list results, and Appendix 1 for an inventory of all listed species and uses). The total number of applications for wild plants listed by experts was 749, representing 77.2% of the total. The number of applications listed ranged from 14 to 88, with a median of 36. On average, experts listed 37.4 applications with a standard deviation of 18.9 and a CRV of .505.

Novices listed a total of 79 wild plant names, constituting 42.2% of the composite plant listing. The length of the novices' plant lists ranged from 5 to 17, with a median of 10.5. The mean list length was 11.4 with a standard deviation of 3.8 and a CRV of .333. Novices listed a total of 221 applications for wild plants, or 22.8% of the total inventory. These applications ranged in number from 5 to 21, with a median of 10.5. The mean number of listed applications for novices was 11.1, with a standard deviation of 4.9 and a CRV of .441. A comparison of the two groups reveals, as expected, a higher mean number of plants free-listed by the expert consultants. The difference in means, 26.4 plants listed by the experts and 11.4 for the novices, is statistically significant ($t = 5.4$, $p < .001$). Statistical significance was also found for the difference in the mean number of applications reported, 37.4 for experts and 11.1 for novices ($t = 6.02$, $p < .001$). Figure 2 graphically displays the positive correlation between the number of plants and the number of applications reported by both groups. As shown in Figure 2, knowledge of plant utilization rises incrementally with an increase in plant-naming knowledge for both consultant groups. The number of plants named and the number of applications reported are significantly correlated for novices ($r = .87$, $p < .001$) and experts ($r = .91$, $p < .001$). While there is some overlap between the level of ethnobotanical knowledge demonstrated by the two groups, the expert-novice distinction is reasonably clear, as indicated by the dispersal of data points on Figure 2.

The Salience of Listed Plants.—The B values given in Table 2 measure free-list salience, or the proportional precedence of a listed plant over others. B is computed as follows:

$$B = \frac{n(n + 2\bar{n} + 1) - 2\sum r(n)}{2n\bar{n}}$$

where n is the number designated subset items, $\bar{n}$ is the number of complement designated subset items and $\Sigma\, r(n)$ is the sum of the free list ordered ranks of the designated subset items (Robbins and Nolan 1997). Here, a B value was computed for each plant free-listed by experts and novices. To calculate individual salience

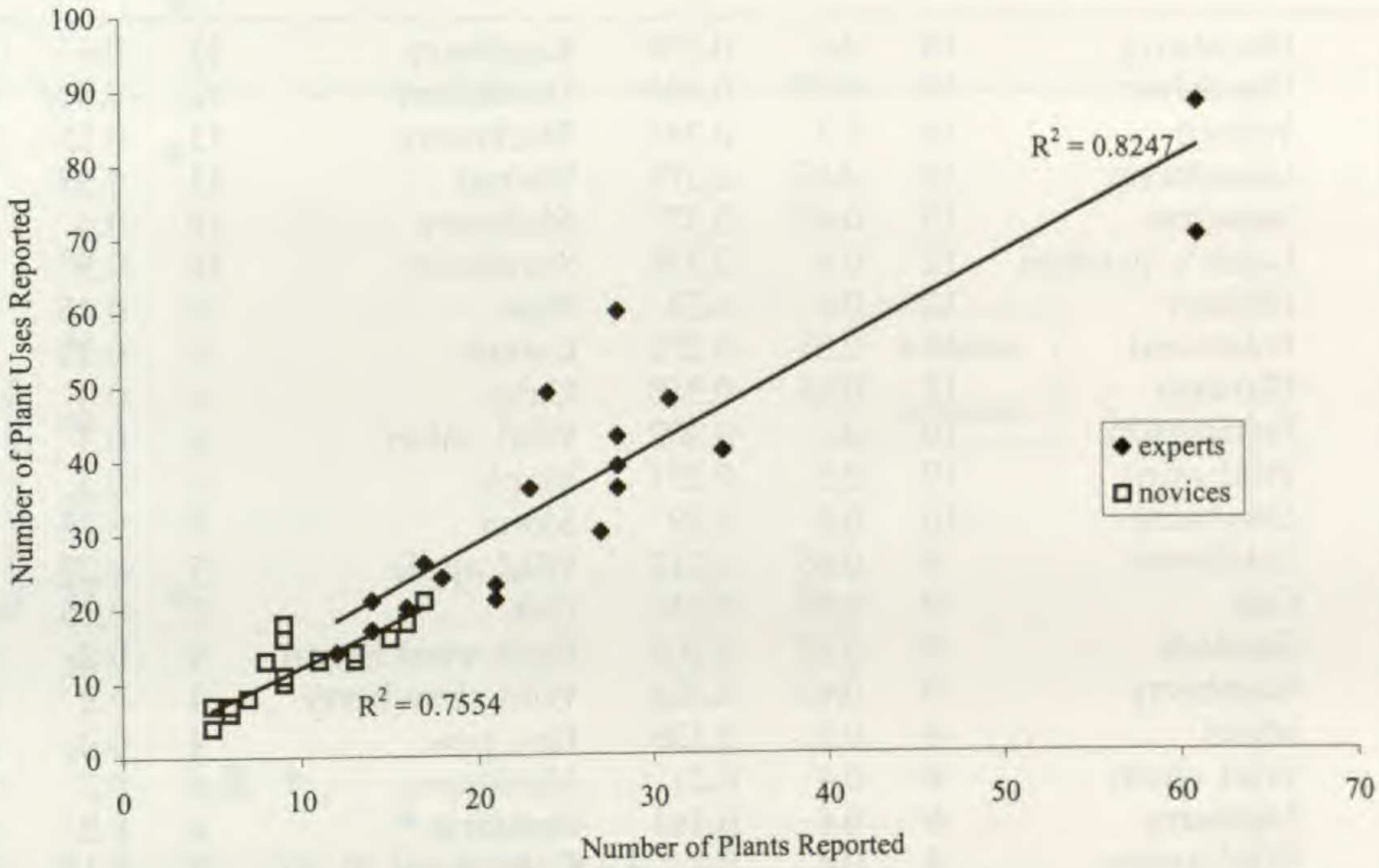


FIGURE 2.—Correlation of number of plants reported to number of plant uses reported in free-lists for experts and novices.

values for a given plant on a free-list, $n = 1$ and $\bar{n}$ = (the total number of listed items) − 1. Ranging between 0 and 1, the B value for a given item reflects the relative proportion of other items it precedes on the list. The B value for each species was summed across all lists and divided by the number of respondents listing the plant to generate a composite B value. To calculate a measure of *overall* cultural significance, the composite B value for each listed species was added to the proportion of respondents listing the plant and divided by 2.

As seen in Table 2, there are more plants with higher frequencies of mention on the experts' inventories than among the novices'. Consider, for example, the three plants mentioned most frequently by experts—blackberry, dandelion, and walnut, which were listed by 18, 15, and 14 experts, respectively. These frequencies are high compared to the three plants mentioned most commonly by novices—raspberry, dandelion, and blackberry, which were listed by only 12, 12, and 11 novices, respectively.

Interestingly, three of the five most frequently mentioned species (blackberry, dandelion, and walnut) are the same for experts and novices. All three of these plants can be used in a number of practical ways. For instance, walnut is a valuable source of food, medicine, lumber, and dyes. Blackberry is also highly venerated for its edible berries, known locally and in the Ozark Mountains to the south as "black gold," and for the food value of its young shoots and its medicinal roots that are often brewed into healing tonics to treat colds, fevers, and colic.

TABLE 2.—Frequency and salience of plants commonly listed by experts and novices.

	Experts				Novices			
Rank	Plant name	Freq.	%	B	Plant name	Freq.	%	B
1	Blackberry	18	0.9	0.579	Raspberry	12	0.6	0.35
2	Dandelion	15	0.75	0.434	Dandelion	12	0.6	0.498
3	Walnut	14	0.7	0.345	Blackberry	11	0.55	0.404
4	Gooseberry	13	0.65	0.379	Walnut	11	0.55	0.243
5	Sassafras	13	0.65	0.377	Mulberry	10	0.5	0.241
6	Lamb's quarters	12	0.6	0.338	Sunflower	10	0.5	0.25
7	Hickory	12	0.6	0.33	Pine	9	0.45	0.225
8	Pokeweed	11	0.55	0.272	Cattail	9	0.45	0.187
9	Plantain	11	0.55	0.315	Daisy	6	0.3	0.136
10	Persimmon	10	0.5	0.302	Wild onion	6	0.3	0.17
11	Wild mint	10	0.5	0.271	Maple	6	0.3	0.185
12	Dewberry	10	0.5	0.29	Morel	5	0.25	0.107
13	Sunflower	9	0.45	0.212	Wild apple	5	0.25	0.069
14	Oak	9	0.45	0.243	Oak	5	0.25	0.127
15	Burdock	9	0.45	0.265	Black-eyed Susan	4	0.2	0.093
16	Raspberry	9	0.45	0.324	Wild strawberry	4	0.2	0.112
17	Morel	8	0.4	0.138	Paw paw	4	0.2	0.101
18	Wild onion	8	0.4	0.21	Marijuana	4	0.2	0.128
19	Mulberry	8	0.4	0.141	Sassafras	4	0.2	0.084
20	Wild grape	8	0.4	0.2	Goldenseal	3	0.15	0.074
21	Cedar	8	0.4	0.154	Hickory	3	0.15	0.074
22	Wild plum	8	0.4	0.232	Wild cherry	3	0.15	0.033
23	Wild strawberry	7	0.35	0.177	Wild rose	3	0.15	0.114
24	Paw paw	7	0.35	0.221	Honeysuckle	3	0.15	0.088

The dandelion is similarly edible; its young leaves and flowers are eaten by both humans and animals, and like the others, it is used regionally in medicinal tonics to treat chills and fevers. Well-known even by those with minimal interest in local flora, it is no surprise to find these species at the top of the list for the novices as well as the experts.

Most interesting, however, are the differences between the two sets of respondents. As seen in Table 2, certain plants are cognitively privileged by one group or the other. Among those plants mentioned frequently by novices, but not by experts, are pine, cattail, daisy, maple, wild apple, and honeysuckle[2]. Similarly, several plants appear exclusively on the experts' inventory, including lamb's quarters, gooseberry, dewberry, plantain, persimmon, and burdock. One explanation for this pattern is the novice predilection for listing plants with high perceptual and ecological salience (e.g., Turner 1988). Plants that are morphologically distinct, bearing obvious physical features (e.g., pine, daisy, cattail) tend to be listed frequently among the untrained. Further, these species are, in general, widely available in the ambient environment. For the most part, novices need not roam far to encounter them. Thus, the perceptual distinctiveness and ecological abundance of these species probably accounts for their high frequency of mention among novice consultants.

On the other hand, species with relatively higher free-list frequency among the experts (e.g., lambsquarters, plantain, burdock) lack the easily distinguishable

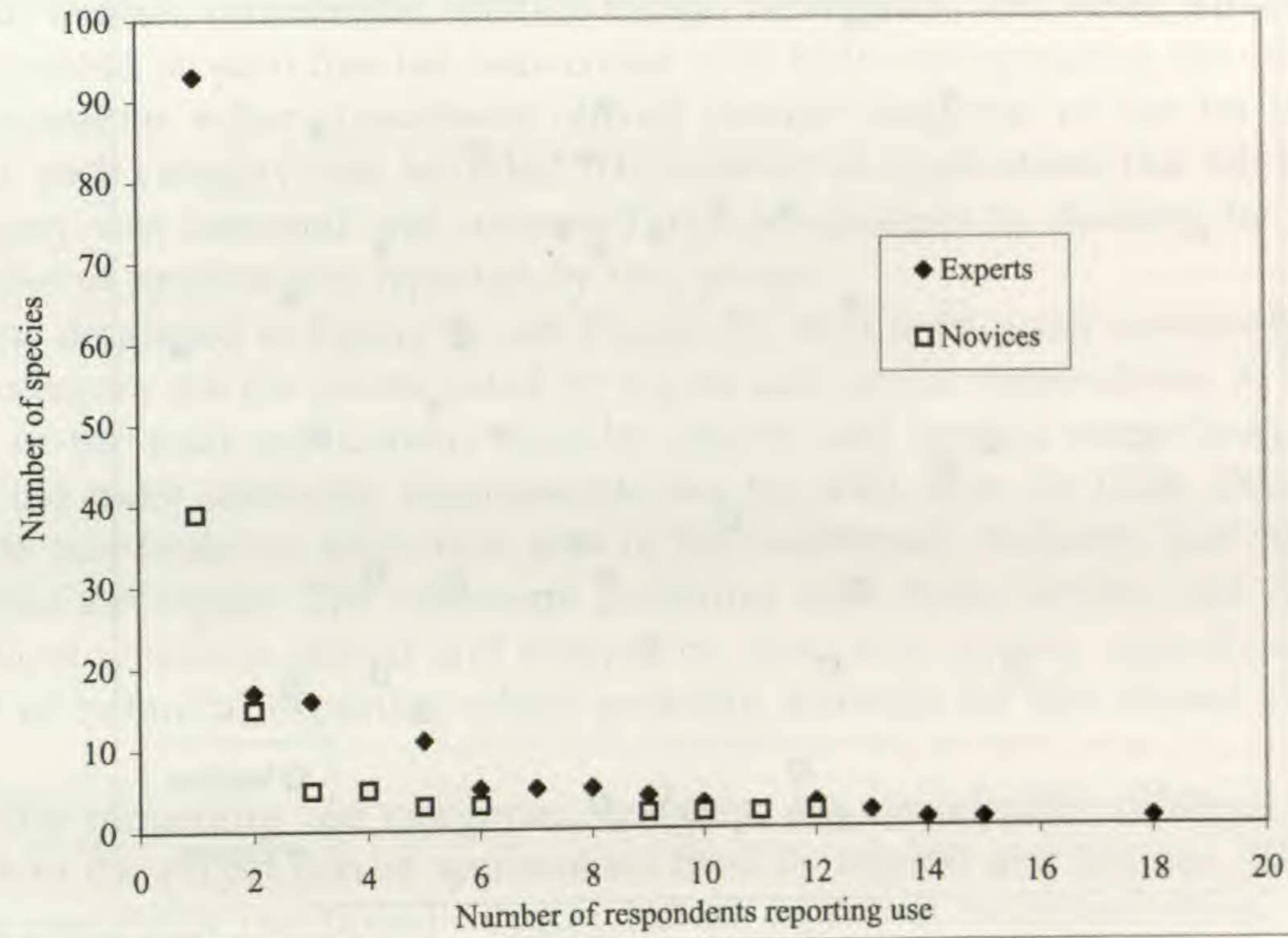


FIGURE 3.—Number of reports of use for all species listed by experts and novices.

features that characterize species with high perceptual salience. Weed-like herbs such as these are not immediately obvious to the untrained eye. Nonetheless, they are emphasized cognitively by the experts who are knowledgeable about their practical uses[3]. To illustrate, the leaves of lambsquarters and burdock are prized for their flavor, edibility, and nutrient value, and plantain leaves are used extensively by experts as a bandage or a poultice for exterior wounds.

The Diversity of Wild Plant Knowledge.—Figure 3 displays the number of reports of use for all wild plant species named by experts and novices in the free-listing task. While the overall knowledge pattern for experts and novices is similar, this abundance diagram conveys an interesting pattern that seems to characterize the plant knowledge of the two groups. That is, experts demonstrate a higher dispersal of knowledge, which is reflected by the higher number of unique, once-mentioned species listed among them. As shown on the diagram, considerably more plants were reported by a single expert (93 species) than were mentioned by a single novice (39 species)[4]. There are fewer instances in which several novices listed the same plant. Alternately, experts demonstrate a higher overlap of listed items. The overall pattern suggested by the abundance diagram is one in which experts have command of a greater diversity of plant knowledge than novices, resulting in both a higher proportion of collective, commonly shared knowledge *and* a higher level of esoteric, idiosyncratic knowledge in the form of once-mentioned species.

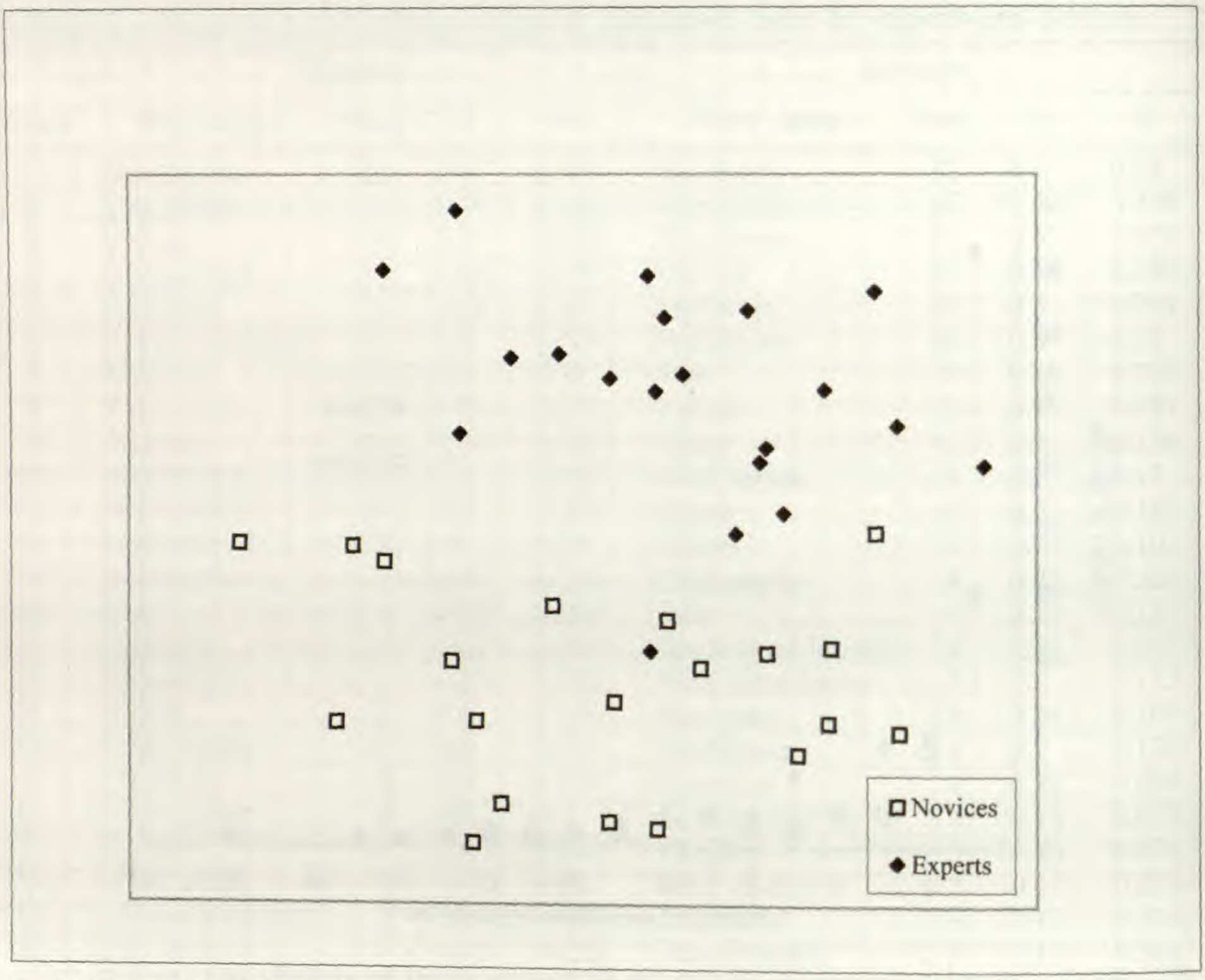


FIGURE 4.—Multidimensional scaling of positive matches between experts' and novices' free lists.

From a qualitative perspective, the differences between the experts' and novices' free-lists are also considerable. To determine the overall extent of free-list similarity, the number of positive matches between listed items was calculated for experts and novices in order to compare the two groups. The resulting coordinates were plotted using multidimensional scaling, or MDS, using the software package ANTHROPAC 4.95 (Borgatti 1998). MDS is a useful technique for visualizing the relations between points or items, whereby points that are closer to each other in two-dimensional space are thought to be more similar than points that are distant.

Figure 4 shows the MDS graphic for the experts' and novices' free-list responses, illustrating the degree to which all respondents mentioned the same plant names in their lists. Interestingly, there is a clear demarcation between the two groups, with novices appearing on the lower half of the graph and the experts at the top. While there is some overlap between the experts and novices, the pattern shown on Figure 4 reveals that experts share more listed items with each other than with novices, and conversely, novices are more similar to each other than to other experts. In other words, two rather distinct constellations of wild plants are mutually exclusive to each of the two groups. These results suggest that, in Little Dixie, two ethnobotanical knowledge structures exist—one for experts and one for novices—rather than a single shared system.

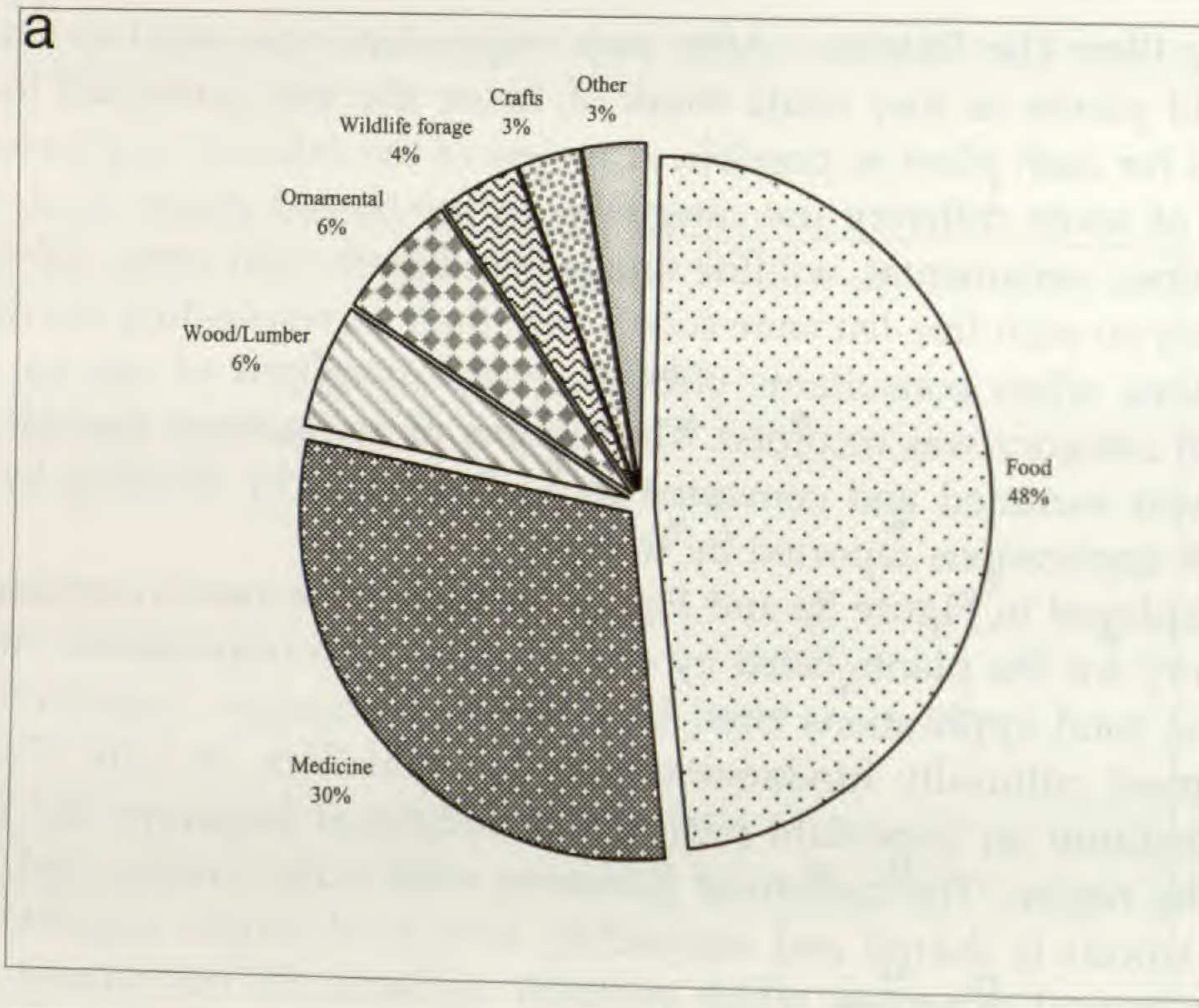
Contrasting Plant Use Patterns.—After each respondent was asked to list as many useful wild plants as they could think of, he or she was prompted to name as many uses for each plant as possible. A review of the collected applications yielded a total of seven different use categories for the named plants: food, medicine, wood/lumber, ornamental, wildlife forage, handicrafts, and other. All wild plant applications on each free-list were coded with their corresponding use categories[5]. On occasions when consultants offered several categories of use for the same plant, each category was recorded. The number of applications that fell into each category was summed and converted into percentages by dividing by the total number of applications reported by that group.

As displayed in Figure 5a and Figure 5b, food is the most commonly named use category for the plants listed by expert and novice respondents. At 48% and 52% of the total applications cited by experts and novices respectively, food is also the most culturally fundamental use for wild flora. In Little Dixie, edible plants constitute an important part of the traditional foodways that help characterize the region. The custom of gathering wild fruits, berries, and nuts from the local woods is shared and enjoyed by most local people, regardless of their level of botanical expertise, which probably accounts for this shared pattern of use.

The remaining use categories, however, are considerably different with respect to the proportion of applications cited by experts and novices. The second most commonly mentioned category for the experts is medicinal plants, comprising a sizeable percentage (38%) of the total reported plant uses by experts. The prevalence of edible and medicinal plants in the expert pharmacopoeia reflects the interest and knowledge in holistic living and natural healing that is pursued and practiced by a number of the expert herbalists who were consulted. The remaining uses given by experts were rather evenly distributed into the decreasingly smaller categories of wood/lumber, ornamental, wildlife forage, other, and crafts.

Among the novices, the food category was followed by ornamental (16%) and wood/lumber (11%). The relatively high percentage of ornamentals listed by novices reflects a significant pattern through the course of this project—the novice predilection toward a perceptually oriented knowledge of wild plants. Ornamental plants are deemed meaningful and useful by virtue of their physical characteristics and visual appeal. Knowledge of ornamentals is readily available to the novice, for it requires only an aesthetic appreciation for the beauty of form—and knowledge of the name of the plant—but not experience with use and function. Comprising only 6.5% of the total uses reported, the medicinal use category ranked fifth in frequency for the novices, after wood/lumber (11%) and wildlife forage (7%).

To compare the overall diversity of the plant use categories for experts and novices, the index of qualitative variation (IQV) was applied to the plant application data. Ranging between 0 and 1, the IQV measures the degree of evenness in the proportional distribution of a sample. The higher the IQV value, the more uniform or balanced the distribution is deemed to be. The IQV is computed as



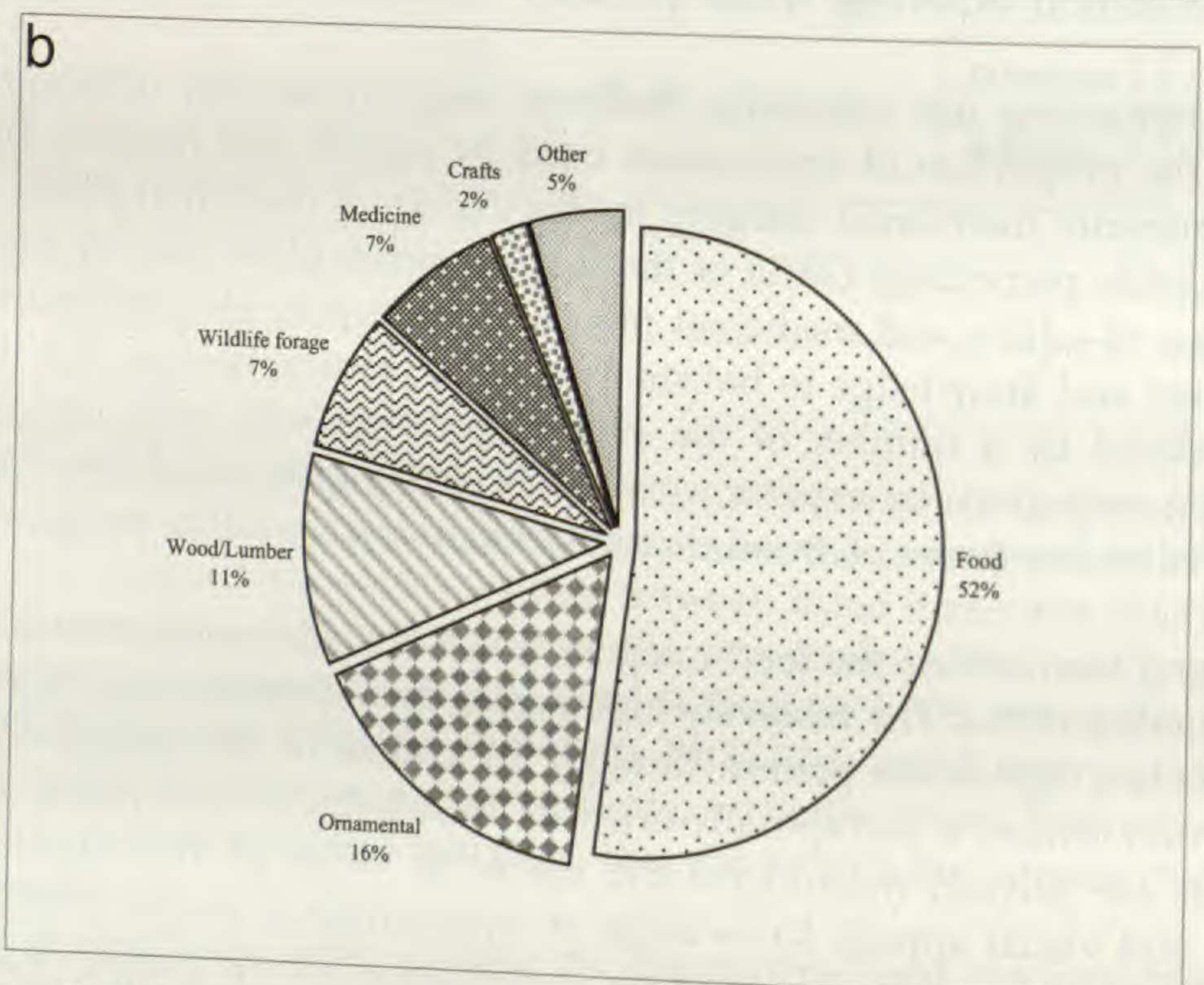


FIGURE 5a.—Distribution of expert uses for plants.

FIGURE 5b.—Distribution of novice uses for plants.

$$\frac{1 - \sum Pi^2}{1 - 1/k}$$

where P*i* is the proportion of plant reports represented by each category and k is the number of use categories. For the experts, the IQV yields a value of .78, and for the novices the IQV is .79. These results indicate that, for each group, the relative degree of evenness in the distribution of plant applications is extremely similar. That is, the seven use categories show a moderately balanced representation for each group.

While the IQV measures distribution or evenness, the index of dissimilarity (D_s) is useful for assessing quantitatively the differences in overall use patterns. D_s is calculated as

$$D_s = \frac{1}{2} \sum |P_e - P_n|$$

where P_e is the proportion of expert plant applications in each category and P_n is the proportion of novice applications in each category. The index of dissimilarity also generates a value between 0 and 1, where 1 indicates perfect dissimilarity and 0 indicates perfect similarity between the groups' categorical distribution. Calculating the index of dissimilarity generates a D_s value of 24%, which means that 24% of either group's distribution would have to change in order to match the other group's distribution.

So where are these differences coming from? While the proportion of applications listed as food is very similar for the two groups, experts know considerably more about medicinal plants than novices, who report far more plants as ornamentally useful. Experts are also more intimately involved and experienced with plants in general, and have acquired through time a more extensive understanding of the cultural uses of plants—particularly the therapeutic aspects. While it takes an expert to understand how to use plants medicinally, anyone can appreciate the beauty of a given species and deem it worthy of ornamental display. This very fact may explain why novices report a much higher number of plants in the ornamental category. Novices know less of the esoteric medicinal functions of wild flora, which requires a level of botanical knowledge and interest more characteristic of expert respondents.

The Expressive Evaluation of Wild Plants.—In descending order, the correlations between the rating scores for experts and novices are: ecological value = .70 ($p < .001$), usefulness = .49 ($p < .05$), preference = .46 ($p < .05$), and beauty = .36 ($p > .05$). These r-values reflect the similarity with which experts and novices rated the plants, especially with regard to ecological value. It is noteworthy, however, that the groups do not correlate significantly when rating the plants according to beauty. These findings agree with those by Chick and Roberts (1987), who determined that machinists and non-machinists rated lathe parts very similarly with respect to complexity, but very differently with regard to beauty. Like the discovery by Chick and Roberts, these results show that the two groups agree most on the highly denotative variable, ecological value, and least on the most connotative variable, beauty.

Table 3 lists the intercorrelations among the four rating variables for experts and novices. For both groups, personal preference appears to be the most important underlying dimension in the evaluation of the wild plant domain. That is, plants that are preferred are also considered useful, ecologically valuable, and beautiful. One interesting expert-novice distinction is clear, however: the correlation values between usefulness and beauty. For the experts, there is a low cor-

TABLE 3.—Multiple correlation of mean ranks of wild plants on four variables (experts' values shown to the left, novices' values in parentheses).

Variable	Preference	Usefulness	Ecological value	Beauty
Preference	1			
Usefulness	0.72*** (0.68)***	1		
Ecological value	0.74*** (0.78)***	0.55* (0.44)*	1	
Beauty	0.62** (0.66)**	0.39 (0.92)***	0.68** (0.57)**	1

***p < .001, **p < .01, *p < .05.

relation for the two variables (.39), yet for the novices, the correlation is very high (.92). The difference between these r-square values was tested and found to be significant (z = 3.31, p < .001). In fact, the difference in r-square values between usefulness and beauty is the only significant disparity between the two groups. This difference, taken in concert with the low rating correlation on the beauty variable, indicates that novices emphasize beauty as an organizational factor in the conceptualization of wild plants. Novices are restricted to purely visual stimuli when abstracting an emotional and/or cognitive impression of a given plant. It follows that a plant's usefulness is a function of its overall perceptual appeal, or beauty. The salience of beauty in wild plant evaluation would also explain the high proportion of ornamental plants free-listed by novices. On the other hand, beauty is significantly de-emphasized in the determination of usefulness in the mind of the expert. Experts have more criteria for usefulness at their disposal (e.g., nutritional value, medical efficacy, etc.). Any of these esoteric factors are most likely used in concert by experts when evaluating the usefulness of different plants.

Thus, it is evident that the accumulation of expertise entails a shift in domain appreciation, or how the domain is evaluated and organized from an expressive point of view. The rating patterns by the two groups indicates that experts and novices have contrasting standards for appreciating wild plants, which appears to be linked to underlying differences in how the domain is organized conceptually.

SUMMARY AND CONCLUSION

It has been shown, as predicted, that experts and novices utilize different referential features in their articulation of wild plants in Little Dixie. These differences are evident by examining the plants and uses cited in the free-lists, which reflect how experts and novices acquire and develop information about ambient flora. Novices are more cognizant of plants with high perceptual and ecological salience, while experts focus on function and display knowledge of species with high use potential, regardless of their distinctiveness or abundance. Although food represents the major use category for both groups, experts use a high proportion of plants for medicinal reasons, while novices use plants much more frequently for ornamental purposes.

An examination of experts' and novices' expressive plant judgements reveals that novices emphasize beauty while experts prioritize cultural value when ranking the species. These findings reaffirm that experts are influenced most by usefulness and practicality, while novices are affected more by aesthetic variables in their organization of plant knowledge. Taken together, the results suggest that the acquisition of ethnobotanical knowledge entails a cognitive shift from morphological factors and sensory perceptions to a more complex comprehension of plants based on abstract, culturally acquired utilitarian factors. This information can be applied in a number of ways to understand how cultural experience shapes our comprehension and appreciation of our natural worlds.

NOTES

[1] For example, Chick and Roberts (1987) examined the evaluation of lathe parts by machinists and non-machinists. The authors discovered that the machinists display more agreement regarding the expressive aspects of lathe parts than the non-machinists, due to the experts' better understanding of how the parts are manufactured.

[2] However, these plants are not absent altogether from the experts' wild plant inventory—they appear further down on the composite list.

[3] Again, the species discussed here do appear on the novices' inventory, but with considerably lower rankings in frequency and salience.

[4] Similar use report patterns by plant experts appear throughout the ethnobotanical literature. For example, in a study of Mestizo plant use in rural Mexico by Benz and his colleagues, many unique or once-mentioned species were listed by expert consultants (Benz et al. 1994). Accordingly, Nolan (1998) found that wild plant experts of the Ozark-Ouachita Highlands listed relatively high proportions of idiosyncratic species. Cognitive anthropologists have found considerable knowledge variation to exist among expert respondents (e.g,. Boster and Johnson 1989, Nolan 2001). These studies offer something of a challenge to cultural consensus theory, which is built on the proposition that agreement or consensus among respondents is indicative of cultural expertise.

[5] The boundaries between certain use categories are often "fuzzy," particularly with respect to food and medicine. For this reason, it was necessary to code a number of plants into multiple categories, such as those used in spring tonics (e.g., sassafras, burdock, may apple). For insightful information on the categorical overlap of food and medicine in people-plant interactions, see Johns (1996, 1994).

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APPENDIX 1.—Composite inventory of free-listed species and their reported uses.

Vernacular name	Scientific name	Uses for plant	Part of plant used
Alum root	*Heuchera americana* L.	medicine	roots
Amaranth	*Amaranthus* L. spp.	food	leaves, seeds
Apple	*Malus pumila* Mill.	food, wood	fruits, whole tree
Ash	*Fraxinus americana* L.	wood	trunk
Asparagus	*Asparagus officinalis* L.	food, tea	whole plant, leaves, seeds
Aster	*Aster* L. spp.	ornamental	flowers
Basswood	*Tilia americana* L.	lumber	wood
Bayberry	*Myrica* L. spp.	crafts, making candles	leaves, berries
Beebalm	*Monarda didyma* L.	ornamental, wildlife forage	all
Beggars lice	*Lappula echinata* Gilib.	wildlife forage, fix nitrogen in soil	plant, seeds
Big Bluestem	*Andropogon gerardii* Vitman.	wildlife forage	plant
Birch	*Betula* L. spp.	lumber, shade	wood, all
Bittersweet	*Solanum dulcamara* L.	ornamental	whole plant (not roots)
Black cohosh	*Cimicifuga racemosa* (L.) Nutt.	medicine	bark
Black haw	*Viburnum prunifolium* L.	medicine	roots
Black locust	*Robinia pseudo-acacia* L.	lumber	wood
Blackberry	*Rubus* L. spp.	food, medicine, wildlife forage, tea	berries, roots, fruits, leaves
Black-eyed Susan	*Rudbeckia hirta* L.	ornamental, flower gardens	flowers, whole flower, plant
Blazing star	*Liatris* Schreb. spp.	ornamental	plant
Bloodroot	*Sanguinaria canadensis* L.	medicine	root
Blue cohosh	*Caulophyllum thalictroides* (L.) Michx.	medicine	roots
Bluebells	*Mertensia virginica* (L.) Pers.	ornamental	whole
Bluestem	*Andropogon virginicus* L.	wildlife forage	whole plant
Boneset	*Eupatorium perfoliatum* L.	medicine	leaves
Burdock	*Arctium minus* Bernh.	food, medicine, blood purifier	leaves, roots
Burhead	*Echniodorus cordifolius* (L.) Griseb.	wildlife forage	seeds
Butterfly weed	*Asclepias tuberosa* L.	wildlife forage	plant
Cardinal flower	*Lobelia cardinalis* L.	water gardens, wildlife forage	all
Carpenters square	*Scrophularia marilandica* L.	medicine, food	leaves, greens
Catnip	*Nepeta cataria* L.	for cat tonic	leaves
Cattail	*Typha latifolia* L.	food, ornamental, sewage treatment	rootstock, stalk, seed head
Chamomile	*Matricaria chamomila* L.	sedative tea, medicine	flowers
Chestnut	*Castanea dentata* (Marsh.) Borkh.	food	nuts

Appendix 1 (continued)

Vernacular name	Scientific name	Uses for plant	Part of plant used
Chickweed	*Stellaria media* L.	medicine, food	leaves, stems, greens, blossoms
Chicory	*Cichorium intybus* L.	food, tea	roots, leaves, flowers
Chokecherry	*Prunus virginiana* L.	medicine	berries, bark
Chufa	*Cyperus esculentus* L.	wildlife forage	seeds
Cleavers	*Galium aparine* L.	medicine	stalk, leaves
Clover	*Trifolium repens* L.	wildlife forage, nitrogen fixing	whole plant
Coltsfoot	*Petasites hybridus* L.	medicine	leaf stem
Columbine	*Aquilegia canadensis* L.	ornamental	flowers
Coreopsis	*Coreopsis tinctoria* Nutt.	flower gardens	plants
Cornflower	*Centaurea cyanus* L.	ornamental	flowers
Cottonwood	*Populus deltoides* Marsh.	lumber	trunk
Cow parsnip	*Heracleum lanataum* Michx.	food	leaves
Crabapple	*Pyrus* L. spp.	food	fruits
Crabgrass	*Digitaria* Heist. spp.	ground cover	all
Currant	*Ribes odoratum* Wendl.	food	berries
Cypress	*Taxodium distichum* (L.) Rich.	lumber	wood
Daisy	*Chrysanthemum leucanthemum* L.	ornamental	flowers
Dandelion	*Taraxacum officinale* Weber.	food, medicine, wildlife forage	flowers, leaves
Daylily	*Hemerocallis fulva* L.	ornamental	flowers
Dewberry	*Rubus flagellaris* Willd.	food, wildlife forage	berries, fruits
Dill	*Anethum graveolens* L.	food, pickling	tops
Dogwood	*Cornus florida* L.	ornamental	whole
Duckweed	*Spirodela* Schleiden spp.	aquatic protection	all
Elderberry	*Sambucus canadensis* L.	food, medicine	berries
Ferns	*Polypodium* (Tourn.) L. spp.	food, ornamental	crowns
Fescue grass	*Festuca* L. spp.	food for cattle	stems, leaves
Feverfew	*Chrysanthemum parthenium* (L.) Bernh.	medicine	leaves
Foxglove	*Digitalis purpurea* L.	medicine	flowers, leaves
Gentian	*Gentiana quinquefolia* L.	medicine	roots, leaves
Ginseng	*Panax quinquefolius* L.	medicine, stimulant	roots
Goats rue	*Tephrosia virginiana* (L.) Pers.	fish bait	plant
Goldenrod	*Solidago* L. spp.	wildlife forage	blossom

Appendix 1 (continued)

Vernacular name	Scientific name	Uses for plant	Part of plant used
Goldenseal	*Hydrastis canadensis* L.	medicine, blood purifier	roots, leaves, plant
Gooseberry	*Ribes missouriense* Nutt.	food, forage	fruits, berries
Grass	various species of Poaceae	wildlife forage, stop erosion	stalk, leaves
Hawthorn	*Crataegus* L. spp.	medicine	roots
Hazelnut	*Corylus* L. spp.	wildlife forage, ornamental, food	whole plant, nuts
Hemlock	*Cicuta maculata* L.	poison	leaves
Hemp	*Cannabis sativa* L.	medicine, crafts, paper products	leaves, stalks, buds, fibers
Hickory	*Carya* Nutt. spp.	food, forage, lumber, crafts	nuts, wood, trunk, bark
Holly	*Ilex opaca* Ait.	ornamental	all, berries, leaves
Horehound	*Marrubium vulgare* L.	medicine	leaves
Horsetail	*Equisetum arvense* L.	scouring pads, musical instruments	stems, stalk
Huckleberry	*Gaylussacia baccata* (Wang.) K. Koch.	food	berries
Hyssop	*Hyssopus officinalis* L.	cleaning	leaves
Indian grass	*Sorghastrum nutans* (L.) Nash	wildlife forage	plant
Indian paintbrush	*Castilleja coccinea* (L.) K. Spreng.	ornamental, flower gardens	flowers, plant
Indigo	*Baptisia* Vent. spp.	crafts, fix nitrogen in soil	plant
Iris	*Iris* L. spp.	wildlife forage, ornamental	plant, all, root
Jack-in-the-pulpit	*Arisaema triphyllum* (L.) Schott.	ornamental	whole plant
Jewelweed	*Impatiens pallida* L.	medicine, poison ivy	leaves, stems
Joe Pye weed	*Eupatorium purpureum* L.	medicine, spring tonic	leaves, roots
Juniper	*Juniperus virginiana* L.	medicine, ornamental, food, windbreak	berries, whole tree
Ladyslipper	*Cypripedium* L. spp.	ornamental	flowers
Lamb's quarters	*Chenopodium album* L.	food, greens, purifier	leaves
Larkspur	*Delphinium* L. spp.	ornamental	whole
Lead plant	*Amorpha canescens* Pursh.	fix nitrogen in soil	plant
Lespedeza	*Lespedeza* Michx. spp.	fix nitrogen in soil	plant
Licorice	*Glycyrrhiza lepidota* (Nutt.) Pursh	food	roots
Lilac	*Syringa vulgaris* L.	ornamental	flower
Little Bluestem	*Andropogon* L. spp.	wildlife forage	plant
Maple	*Acer saccharum* L.	lumber, ornamental, food, shade	wood, whole tree, sap, trunk
Marijuana	*Cannabis sativa* L.	clothing, smoking, medicine	leaf, buds
May apple	*Podophyllum peltatum* L.	medicine, food	fruits

Appendix 1 (continued)

Vernacular name	Scientific name	Uses for plant	Part of plant used
Milkweed	*Asclepias syriaca* L.	medicine, wildlife forage	milk, pod, leaves
Miner's lettuce	*Lactuca* L. spp.	food	leaves, greens
Morel	*Morchella esculenta* L.	food, medicine	whole mushroom, tops
Mugwort	*Artemisia vulgaris* L.	insect repellent	leaves
Mulberry	*Morus rubra* L.	food, medicine, shade	fruits, berries
Mullein	*Verbascum thapsus* L.	ornamental, medicine, toilet paper	whole plant, leaves
Mustard	*Brassica* L. spp.	food	seeds
Nettles	*Urtica* L. spp.	crafts, medicine, food	leaves, fruit, greens
Ninebark	*Physocarpus opulifolius* L.	stabilize stream bank, medicine	whole plant, inner bark
Oak	*Quercus* L. spp.	lumber, crafts, forage, firewood, shade	wood, acorns, trunk, nuts
Ohio buckeye	*Aesculus hippocastanum* L.	good luck piece	nuts, wood
Osage orange	*Maclura pomifera* (Raf.) Schneid.	firewood, moth repellent	wood, fruit
Passionflower	*Passiflora incarnata* L.	medicine	leaves
Paw paw	*Asimina triloba* (L.) Dunal	food	fruits
Peach	*Prunus persica* L.	food	fruits
Pear	*Pyrus communis* L.	food	fruits
Pecan	*Carya illinoensis* (Wang.) K. Koch.	food, wood	nuts, wood
Pencil flower	*Stylosanthes biflora* (L.) BSP.	fix nitrogen in soil	plant
Pennyroyal	*Hedeoma pulegioides* (L.) Pers.	tea, medicine	leaves
Persimmon	*Diospyros virginiana* L.	food	fruits, seeds
Pickerel weed	*Pontederia cordata* L.	water gardens, wildlife forage	plant
Pine	*Pinus echinata* L.	lumber, ornamental, shade, food	wood, trunk, cones, needles
Plantain	*Plantago major* L.	medicine, food	leaves, roots, flowers, all
Pokeweed	*Phytolacca americana* L.	food, crafts, medicine	leaves, berries, greens
Poppy	*Argemone albiflora* Hornem.	food	seeds
Prairie cordgrass	*Spartina pectinata* Link.	stabilize stream bank	plant
Prairie dropseed	*Sporobolus heterolepis* (Gray) Gray	wildlife forage	plant
Prickly pear	*Opuntia humifusa* (Raf.) Raf.	food	leaves, fruits, flowers
Primrose	*Oenothera biennis* L.	flower gardens, food, medicine	plant, oil
Purple coneflower	*Echinacea purpurea* (L.) Moench.	medicine, wildlife forage	leaves, roots, flowers, all
Purslane	*Portulaca oleracea* L.	food	greens, leaves
Pussywillow	*Salix humilis* Marsh.	ornamental	stems
Queen Anne's lace	*Daucus carota* L.	attracting insects, wildlife forage	flowers, leaves

Appendix 1 (continued)

Vernacular name	Scientific name	Uses for plant	Part of plant used
Quinine	*Parthenium integrifolium* L.	medicine	roots, leaves
Raspberry	*Rubus strigosus* Michx.	food, medicine	berries, roots, leaves, fruit
Rattlebox	*Crotolaria* L. spp.	fix nitrogen in soil	plant
Rattlesnake master	*Eryngium yuccifolium* Michx.	crafts	leaves
Red clover	*Trifolium pratense* L.	wildlife forage, medicine	flowers, leaves
Redbud	*Cercis canadensis* L.	ornamental, shade	whole plant
Royal catchfly	*Silene regia* Sims.	flower gardens	plant
Sarsaparilla	*Aralia nudicaulis* L.	food	leaves
Sassafras	*Sassafras albidum* (Nutt.) Nees.	food, medicine, tea, lumber	roots, bark, trunk, leaves
Senna	*Cassia marilandica* L.	medicine	leaves
Shadbush	*Amelanchier arborea* (Michx. f.) Fern.	ornamental	whole plant
Sheep sorrel	*Rumex acetosella* L.	food	leaves
Shepherd's purse	*Capsella bursa-pastoris* (L.) Medic.	medicine	leaves, stem
Shooting stars	*Dodecatheon meadia* L.	ornamental	plant
Slippery elm	*Ulmus rubra* Muhl.	medicine	bark
Smartweed	*Polygonum* L. spp.	wildlife forage	seeds
Snakeroot	*Eupatorium rugosum* Houtt.	medicine, treatment for snakebite	root
Snow on the mountain	*Euphorbia marginata* Pursh.	ornamental	plant
Solomons seal	*Polygonatum* Mill. spp.	medicine	leaves
Sorrel	*Rumex* L. spp.	food	leaves
Spearmint	*Mentha spicata* L.	food, tea	leaves
Spiderwort	*Tradescantia subaspera* Ker.	ornamental	whole plant
Sumac	*Rhus* L. spp.	medicine, spring tonic	berries, bark, fruit
Sunflower	*Helianthus annuus* L.	food, ornamental, wildlife forage	seeds, whole flower, plant
Sweet clover	*Melilotus alba* Medic.	wildlife forage	nectar
Sweet William	*Phlox divaricata* L.	ornamental	whole plant
Switch grass	*Panicum virgatum* L.	wildlife forage, levee stabilizer	plant
Sycamore	*Platanus occidentalis* L.	lumber	trunk
Tansy	*Tanacetum vulgare* L.	insect repellent	flower, leaves
Teasel	*Dipsacus sylvestris* Huds.	ornamental	head, stem
Trumpet vine	*Campsis radicans* (L.) Seem.	ornamental	all
Violet	*Viola* L. spp.	ornamental, medicine, food, perfume	leaves, flowers, greens, blossoms

Appendix 1 (continued)

Vernacular name	Scientific name	Uses for plant	Part of plant used
Walnut	*Juglans* L. spp.	food, medicine, poison, firewood, forage	nuts, hulls, bark, wood
Watercress	*Nasturtium officinale* R. Br.	medicine, food	leaves, greens, blossoms
Waterlily	*Nymphaea odorata* Ait.	ornamental	all
Weeping willow	*Salix babylonica* L.	shade	whole tree
White clover	*Trifolium repens* L.	fix nitrogen in soil	plant
White sage	*Artemisia ludoviciana* Nutt.	medicine	leaves
Wild cherry	*Prunus serotina* Ehrh.	food, medicine, lumber	berries, bark, fruit
Wild chervil	*Anthriscus cerefolium* (L.) Hoffm.	food, garnish	stems, leaves
Wild garlic	*Allium canadense* L.	food	bulb
Wild ginger	*Asarum canadense* L.	medicine	roots
Wild grape	*Vitis* L. spp.	food, wine, ornamental	fruits, vines
Wild mint	*Mentha arvensis* L.	food, medicine, tea	leaves
Wild oats	*Uvularia sessilifolia* L.	food	grain
Wild onion	*Allium stellatum* Ker.	food, medicine, blood purifier	bulb, roots, leaves, stalk
Wild parsnip	*Pastinaca sativa* L.	food	roots
Wild plum	*Prunus americana* L.	food	fruits
Wild rose	*Rosa* L. spp.	food	berries
Wild strawberry	*Fragaria virginiana* L.	food	berries, fruits
Willow	*Salix alba* L.	medicine, crafts, ornamental, food	bark, whole tree, stalks, leaves
Winter cress	*Barbarea vulgaris* R. Brown	food	greens
Yarrow	*Achillea millefolium* L.	medicine	leaf stem, flowers
Yellow dock	*Rumex crispus* L.	blood purifier, medicine	roots, bark, leaves